UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

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MEMORANDUM

SUBJECT: Review of Benomyl Incident Reports
DP Barcode 229878, Chemical #099101

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BACKGROUND

The following data bases have been consulted for the poisoning incident data on the active ingredient Benomyl (PC Code: 099101):

1) OPP Incident Data System (IDS) - reports of incidents from various sources, including registrants, other federal and state health and environmental agencies and individual consumers, submitted to OPP since 1992. Reports submitted to the Incident Data System represent anecdotal reports or allegations only, unless otherwise stated. Typically no conclusions can be drawn implicating the pesticide as a cause of any of the reported health effects. Nevertheless, sometimes with enough cases and/or enough documentation risk mitigation measures may be suggested.

2) Poison Control Centers - as the result of a data purchase by EPA, OPP received Poison Control Center data covering the years 1993 through 1996 for all pesticides. Most of the national Poison

Control Centers (PCCs) participate in a national data collection system, the Toxic Exposure Surveillance System which obtains data from about 65-70 centers at hospitals and universities. PCCs provide telephone consultation for individuals and health care providers on suspected poisonings, involving drugs, household products, pesticides, etc.

3) California Department of Pesticide Regulation - California has collected uniform data on suspected pesticide poisonings since 1982. Physicians are required, by statute, to report to their local health officer all occurrences of illness suspected of being related to exposure to pesticides. The majority of the incidents involve workers. Information on exposure (worker activity), type of illness (systemic, eye, skin, eye/skin and respiratory), likelihood of a causal relationship, and number of days off work and in the hospital are provided.

4) National Pesticide Telecommunications Network (NPTN) - NPTN is a toll-free information service supported by OPP. A ranking of the top 200 active ingredients for which telephone calls were received during calendar years 1984-1991, inclusive has been prepared. The total number of calls was tabulated for the categories human incidents, animal incidents, and calls for information.

Note that four earlier incident reviews of benomyl have been completed. These reviews were primarily based on IDS incident reports and lawsuits associated with a specific benomyl product, Benlate DF, which was voluntarily cancelled. The overwhelming majority of these reports were unaccompanied by medical documentation or any quantitative or even qualitative information about the exposure. These earlier reviews are listed below:

1. Review of Benomyl Poisoning Incidents. Oct. 14, 1992. Memorandum from Jerome Blondell to Kate Bouve.

2. Review of Benomyl Poisoning Incidents, Cases Submitted by Dupont and Puerto Rico law suit. Feb. 18, 1993. Memorandum from Jerome Blondell to Kate Bouve.

3. Review of Benomyl Data. Jan. 6, 1994. Memorandum from Jerome Blondell to Kate Bouve.

4. Review of law suits/800 number calls on Benomyl. May 8, 1995. Memorandum from Jerome Blondell to Carl Crable.

BENOMYL REVIEW

I. Incident Data System

Please note that the following cases from the IDS do not have documentation confirming exposure or health effects unless otherwise noted.

Incident#959-1

A pesticide incident occurred in 1994, when a woman who works at a nursery handled paper containing evergreen seeds sprayed with benomyl. She handled the paper with her thumbs and index fingers and experienced redness and burning. Ten days later, she experienced pain, cyanosis, coldness in her right thumb, and fever and chills. Her white blood cell count was high and she was hospitalized for two days. No further information on the disposition of the case was reported.

Incident#2455-1

A pesticide incident occurred in 1995, when a family of 8 (including 6 children) was sprayed with benomyl during an aerial treatment of an adjacent bean field. The family washed themselves immediately. Later that day and the following day, they experienced coughing, burning eyes, sore throats, headaches, and nausea. No further information on the disposition of the case was reported.

Incident#3820-1

A pesticide incident occurred in 1996, when a field worker re-entered a watermelon field twenty-four hours after the field was treated and experienced a rash on his arms and the trunk of his body. No further information on the disposition of the case was reported.

Incident#3974-1

A pesticide incident occurred in 1996, when a woman experienced a severe stinging face after a tractor sprayed flowers across the street from her which drifted in her direction. No further information on the disposition of the case was reported.

Incident#5296-1

A lawsuit alleges the consumption of raspberries treated with benomyl resulted in the person suffering an inflamed gall bladder. No evidence was provided which substantiated this claim and no further information on the disposition of the case was reported.

Incident#5301-1

A pesticide incident occurred in 1997, when three workers were exposed to benomyl and triadimefon after a field was treated aerially. One individual experienced repeated vomiting, dizziness, and headaches. The other two individuals experienced headaches. No further information on the disposition of the case was reported.

Incident#5673-1,2,3

Three lawsuits were filed in West Virginia alleging three cases of birth defects (microphthalmia or anophthalmia). No evidence was provided that documented the exposure or the link between exposure and effects. No further information on the disposition of these cases was reported.

Incident#5674-1,2,3

Three lawsuits filed in Delaware alleged birth defects which occurred to residents in foreign countries (Scotland, New Zealand, and England). No evidence was provided that documented the exposure or the link between exposure and effects. No further information on the disposition of these cases was reported.

Incident#6559-1

A pesticide incident occurred in 1998, when twenty-five inmates and three security officers were exposed after a soybean field was treated aerially. They experienced itching and eye irritation. No further information on the disposition of the case was reported.

II. Poison Control Center Data - 1993 through 1996

Results for the years 1993 through 1996 are presented below for non-occupational cases involving adults and older children. There were only 11 occupational exposures (3 with minor medical outcome and 3 with moderate outcome, 8 seen in a health care facility and 2 hospitalized). Among children under age six there were 28 exposures, none of which were followed to determine outcome and just 3 of which were seen in a health care facility (none hospitalized). Table 1 presents the hazard information for benomyl compared with all other pesticides on six measures: percent with symptoms, percent with moderate, major, or fatal outcome, percent with major or fatal outcome, percent of exposed cases seen in a health care facility, and percent hospitalized and percent seen in a critical care facility. Table 1 presents this information for non-occupational cases involving adults and older children (six years or older).

Table 1. Comparison between benomyl and all pesticides for percent cases with symptomatic outcome (SYM), moderate or more severe outcome (MOD), life-threatening or fatal outcome (LIFE-TH), seen in a health care facility (HCF), hospitalized (HOSP), or seen in an intensive care unit (ICU) reported to Poison Control Centers, 1993-1996 for non-occupational cases involving adults and older children.

Pesticide	SYM*	MOD*	LIFE-TH*	HCF*	HOSP*	ICU*
Benomyl	63.2%	0%	0%	15.4%	25%	0%
All Pesticides	70.8%	10.8%	0.34%	18.7%	7.62%	3.36%

* Symptomatic cases based on those cases with a minor, moderate, major, or fatal medical outcome. Denominator for SYM, MOD, and LIFE-TH is the total cases where medical outcome was determined. Denominator for HCF is all exposures. Denominator for HOSP and ICU is all cases seen in a health care facility.

For non-occupational cases involving adults and older children or young children, benomyl has a lower hazard profile compared to all other pesticides. Of the 8 cases seen in a health care facility, two were hospitalized which resulted in a higher percentage than other pesticides, but based on too few cases to be considered significant. The most common signs and symptoms judged to be related to benomyl exposure in children or adults were dermal and ocular, reported in 19 cases.

III. California Data - 1982 through 1993

Detailed descriptions of 219 cases submitted to the California Pesticide Illness Surveillance Program (1982-1993) were reviewed. In 35 of these cases, benomyl was used alone and was judged to be responsible for the health effects. Only cases with a definite, probable or possible relationship were reviewed. Benomyl ranked 87th as a cause of systemic poisoning in California. Table 2 presents the types of illnesses reported by year. Table 3 gives the total number of workers that took time off work as a result of their illness and how many were hospitalized and for how long.

Table 2. Cases Due to Benomyl Exposure in California Reported by Type of Illness and Year, 1982-1993

Year	Illness Type				
	Systemic[b]	Eye	Skin	Combination[c]	Total
1982	2	-	2	-	4
1983	1	-	1	-	2
1984	-	2	1	-	3
1985	1	-	2	-	3
1986	-	-	1	-	1
1987	1	-	2	-	3
1988	-	1	7	1	9
1989	1	1	2	-	4
1990	-	-	1	-	1
1991	-	1	3	-	4
1992	1	-	-	-	1
1993	-	-	-	-	-
Total	7	5	22	1	35

[b] Category includes cases where skin, eye, or respiratory effects were also reported
[c] Category includes combined irritative effects to eye, skin, and respiratory system

Table 3. Number of Persons Disabled (taking time off work) or Hospitalized for Indicated Number of Days After Benomyl Exposure in California, 1982-1993.

	Number of Persons Disabled	Number of Persons Hospitalized
One day	1	-
Two days	1	-
3-5 days	1	-
6-10 days	-	-
more than 10 days	-	-
Unknown	2	-

A total of 22 persons had systemic illnesses or 62.9% of 35 persons. A variety of worker activities were associated with exposure to benomyl as illustrated in Table 4 below.

Table 4. Illnesses by Activity Categories for Benomyl Exposure in California, 1982-1993

Activity Category	Illness Category				
	Systemic[b]	Eye	Skin	Combination[c]	Total
Applicator	5	2	11	-	18
Mixer/loader	-	2	1	-	3
Packing/Processing	-	-	2	-	2
Field Residue	2	1	8	1	12
Total	7	5	22	1	35

[b] Category includes cases where skin, eye, or respiratory effects were also reported
[c] Category includes combined irritative effects to eye, skin, and respiratory system

According to the above activity categories, pesticide handlers (applicators and mixer/loaders) were associated with the majority (60%) of the exposures. These illnesses included symptoms of rashes and contact dermatitis on neck, face, ears, arms, and other body parts, dizziness, weakness, and eye irritation. Contact with field residue, 34% of cases, was also a substantial source of illness among workers.

IV. National Pesticide Telecommunications Network

On the list of the top 200 chemicals for which NPTN received calls from 1984-1991 inclusively, benomyl was ranked 42nd with 90 incidents in humans reported and 6 incidents in animals (mostly pets).

V. Conclusions

From the review of California data, it appears that a majority of cases involved skin illnesses such as rashes and contact dermatitis that resulted in medical attention. About two-thirds of these cases occurred in workers who had direct contact from handling the pesticide. Exposure to field residue was also a significant source of adverse effects, though it should be noted that most of these cases resulted from intensive contact with treated foliage and were often not shown to be conclusively due to the benomyl exposure. Poison Control Center data would tend to support the California results, dermal and ocular effects were the most common effects reported. Isolated case reports of birth defects (anophthalmia and microphthalmia) have insufficient documentation of exposure to benomyl to warrant a conclusion that benomyl is a likely cause of these birth defects.

VI. Recommendations

Appropriate protective clothing to protect the skin and eyes of handlers is recommended . For workers who may have extensive exposure to benomyl due to contact with residues, skin protection should be required.

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Benomyl file (chemical no. 099101)
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